REMARKS

The Official Action rejects claims 1-5 under 35 U.S.C. § 101 for being inoperative and therefore lacking utility. Additionally, the Official Action rejects claims 1-5 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement. Further, the Official Action rejects claims 1-5 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,633,720 to Frank R. Dybel, et al. and under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,591,620 to Hiroshige Kikuchi, et al. Independent Claim 1 has been amended in order to more clearly define the claimed invention and to further patently distinguish the claimed invention from the cited references. Additionally, one paragraph of the specification has been amended to be consistent with the remainder of the specification. Based on the foregoing amendments and the following remarks, reconsideration of the present application and allowance of the claims are respectfully requested.

The Rejections Under 35 U.S.C. §§ 101 and 112, First Paragraph

As now set forth by independent claim 1, a method of generating service loads includes: (A) developing a service load history database including multiple time series models representative of different service load conditions, (B) combining the multiple time series models, (C) adjusting a parameter of each of the time series models and creating an accelerated service load model, (D) regenerating random vibration load data based upon the accelerated service load model and (E) feeding the load data to a drive simulation system. As set forth below, each of these steps is described by the specification in a manner that will enable one skilled in the art to make and use the claimed invention and in such a manner that the resulting method is operative and therefore satisfies the utility requirement.

As described on pages 3 and 4 of the present application, time series models are developed that are representative of different service loads. For example, page 4, lines 22-24 of the present application identifies exemplary service loads as those created by

road surface fluctuations or fluctuations of wind pressures, *e.g.*, wind gusts. For each service load of interest, a time series model is developed and stored to permit future reconstruction of the service loads. In this regard, page 3, lines 28-30 of the present application states: "Original random vibration service loads are modeled in different time series models and stored in a computer for future reconstruction of service loads." For example, page 5, lines 8-11 of the present application notes that different time series models may be constructed to represent the service loads attributable to travel over a sand road, a concrete road, a soil road and an asphalt road. As set forth on page 3 of the present application, one common time series model is an autoregressive moving average (ARMA) model and another time series model is an AR(p) model. For example, page 4, line 30 – page 5, line 2 of the present application states that "[o]nly one AR(p) model is needed to represent one type of service condition. For example, for the ground vehicle random vibration, soil ground and concrete ground can be represented in two AR(p) models." Both the ARMA model and the AR model are well known to those skilled in the art such that one skilled in the art would understand the manner in which the parameters of the respective model, such as φ_i and φ_j, are to be determined for a respective service load. In this regard, page 4, lines 24 and 25 of the present application states that "[t]he least square method can be used to determine all of the model parameters." Additionally, the data that comprises the actual service load can be recorded in the field, such as directly from sensors. *See* page 4, lines 21 and 22 and page 5, lines 2 and 3 of the present application.

Once the time series models have been developed, the time series models are combined as described on page 5, lines 4-11 of the present application. As noted on page 4, lines 5-8 of the present application, multiple times series models, each representative of a different service load, may be combined in different proportions with the proportion depending upon the estimated time during which the object under test will be subjected to the respective service load during its anticipated lifetime. For example, if a vehicle under test is anticipated to travel over asphalt roads for 80% of its life and over gravel for 20% of its life, the resulting combination of the time series models would weight the time

series model representative of the service loads to which the vehicle is subjected while traveling over an asphalt road by 80% and the time series model representative of the service loads to which the vehicle are subjected while traveling over a gravel road by 20%.

In order to create an accelerated service load model, a parameter of each of the time series models is adjusted. As described further in independent claim 3 and as similarly described by the present application, a parameter that is based upon the standard deviation σ_a of the distribution represented by the respective time series model may be changed to effectively accelerate the service load model. In this regard, the ARMA and AR models are described to represent normally independent distributions having a mean value of zero and a standard deviation of σ_a. *See* page 4, lines 7 and 8 of the present application. By changing the value of σ_a^2 in the resulting time series models, the resulting service load model is accelerated without altering the sequencing or the shape of the autospectrum of the reconstructed signals. *See* page 5, lines 12-16 of the present application.

Thereafter, random vibration load data is regenerated based upon the accelerated service load model. As described on page 5, line 18 – page 6, line 5 of the present application, the random vibration load data may be generated in a recursive manner based upon a series of random data $a_1, a_2 \ldots$ with the random data being generated such that the mean of the random data is zero and the standard deviation of the random data is σ_a. In accordance with the exemplary recursive formula set forth on page 5, lines 24-31, data x_1, $x_2, x_3 \ldots$ may be generated based upon the random data and the application of that random data to the accelerated service load model. The resulting data x_t, i.e., $x_1, x_2, x_3, \ldots$, is the random vibration load data and typically represents the amplitude of a load signal at a respective time t (t = 1, 2, 3 …). As those skilled in the art will recognize, the units of x_t depend upon the manner in which the service load is recorded and to be applied, such as in terms of displacement, acceleration or the like. The random vibration load data is then utilized to drive a simulation system, such as by converting the load data into digital signals (see Figure 2) that may then be utilized to "drive a computer-controlled

actuator to simulate ground fluctuations, vibrations caused by propulsion systems, and/or vibrations caused by ocean waves, etc." *See* page 6, lines 8-10 of the present application.

As described above, the method of generating service loads is operative and therefore satisfies the utility requirement in that the steps of the method set forth by independent claim 1 are described by the specification in a manner that would be understood by one skilled in the art to allow multiple time series models representative of different types of service loads to be developed and then combined with a parameter of the resulting combination of the time series models being adjusted to create an accelerated service load model that is then utilized to generate random vibration load data that is utilized to drive a simulation system, thereby permitting accelerated testing of an object, such as a vehicle, under realistic test conditions. Moreover, the method of generating service loads as set forth by the claimed invention satisfies the enablement requirement as set forth above. As such, the rejections of the claims under 35 U.S.C. §§ 101 and 112, first paragraph, are therefore overcome.

The Rejections Under 35 U.S.C. §§ 102

As to the rejections under 35 U.S.C. § 102, neither of the cited references teaches or suggests several elements of amended independent claim 1. In this regard, neither of the cited references teaches or suggests combining multiple time series models, adjusting a parameter in each of the time series models to create an accelerated service load model and then regenerating random vibration load data based upon the accelerated service load model that is used to drive a simulation system. Indeed, while the cited references may describe the generation of different models representative of different load conditions, these models are not combined and a parameter of these models is not adjusted in order to create an accelerated service load model. Moreover, the models described by the cited references are not eventually utilized so as to generate random vibration load data that is fed to a drive simulation system in order to generate service loads as set forth by amended independent claim 1. As such, neither of the cited references, taken either individually or in combination, teaches or suggests the method of amended independent

claim 1. Thus, the rejections of independent claim 1, as well as claims 2-5 which depend therefrom, are overcome.

CONCLUSION

In view of the amendments to the claims and the specification and the remarks presented above, it is respectfully submitted that all of the claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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